

REMARKS

The following remarks are prepared in response to the Office Action of November 22, 2006. Claims 1-21 are pending in this application. Claims 20-21 have been added. The newly drafted claims are within the scope of the original application and do not add any new matter. Reconsideration in light of the remarks made herein is respectfully requested.

Widely used glass spiral tubes have bulb wall loading set high in order to attain the same luminous flux as an incandescent lamp (Specification, Page 2, Lines 18-20). This causes the cold spot temperature of the glass tube, under steady state illumination, to exceed the optimum cold spot temperature at which maximum luminous flux is radiated (Specification, Page 2, Lines 20-23). Consequently, prior art glass spiral tubes fail to achieve the best luminous efficiency (Specification, Page 3, Line 1). Thus, it should be appreciated that there is a need for a glass spiral tube that achieves optimum luminous efficiency. The invention fulfills this need as well as others.

The present invention relates to a low pressure mercury lamp having a glass spiral tube with a cold spot temperature, under steady state illumination, substantially equal to the optimum cold spot temperature at which maximum luminous flux is radiated (Specification, Page 4, Lines 3-7). The cold spot temperature may be within a range of 60 °C to 65 °C inclusive (Specification, Page 4, Lines 19-21). The glass spiral tube may have a substantially circular cross section, with an inner tube diameter in a range of 5 mm to 9 mm inclusive (Specification, Page 4, Lines 15-17), or a substantially elliptical cross section, with an inner tube major axis in a range of 5 mm to 9 mm inclusive and an inner tube minor axis of 3 mm or larger (Specification, Page 5, Lines 5-8). The bulb wall loading may be within a range of 0.08 W/cm² to 0.12 W/cm² inclusive (Specification, Page 5, Lines 17-18).

The Office Action contends that Claims 1, 3-5 are obvious over a combination of *Ilyes* (U.S. Patent No. 6,633,128) in view of *Sarver* (U.S. Patent No. 5,882,237). The Office Action also contends that Claims 2, 9 and 14 are obvious over a combination of *Ilyes* in view of *Sarver*, and further in view of *Takahashi* (JP 05151935).

Applicants respectfully traverse these contentions.

It should be noted that the burden of establishing a *prima facie* case of obviousness lies with the Patent Office. *In re Fine*, 5 USPQ2d 1596 (Fed. Cir. 1988) (stating: “The PTO has the burden under section 103 to establish a *prima facie* case of obviousness”). To establish a *prima facie* case of obviousness, (1) there must be some suggestion or motivation (either in the references themselves or in the knowledge generally available to one of ordinary skill in the art) to combine the reference teachings; (2) there must be a reasonable expectation of success; and (3) the prior art reference must teach or suggest all the claim limitations. See *MPEP* §§ 2142-43.

Independent Claim 1 recites “[a]n arc tube having a glass tube that is wound into a spiral, wherein

- [A] the glass tube has an inner shape of a substantially circular cross section, with an inner tube diameter in a range of 5 mm to 9 mm inclusive, and
- [B] a bulb wall loading is set so that a temperature of a coldest spot within the glass tube under steady state illumination falls into a range of 60° C to 65° C inclusive.”

The *Ilyes* reference is directed to low-pressure discharge lamp with a double spiral shaped discharge tube and a cold chamber. The diameter d of the discharge tube is between 10-15 mm with a wall thickness being 0.8-1.2 mm (Col. 3, Lines 62-67). The discharge tube has an inner diameter of 8.8 mm.

The *Sarver* reference is directed to a fluorescent lamp with a straight tube containing mercury zinc amalgam (Col. 2, Lines 29-31). The *Sarver* reference teaches that the mercury zinc amalgam is in a metastable, nonequilibrium state (Col. 1, Lines 9-16). The *Sarver* reference notes that “[t]emperature controlled fluorescent lamps may operate with a cold spot temperature below about 75° C (typically ranging from 20° to 75° C) and desirably 40° to 60° C” (Col. 1, Lines 51-57).

“A reference may be said to teach away when a person of ordinary skill, upon reading the reference, would be discouraged from following the path set out in the reference, or would be led in a direction divergent from the path that was taken by the applicant.” *In re Fulton*, 391 F.3d 1195, 1201, 73 U.S.P.Q.2d 1141, 1145 (Fed. Cir. 2004). Claim 1 recites a temperature of the coldest spot in the glass tube within a range of 60° C to 65° C inclusive. The *Ilyes* reference emphasizes that the desirable cold spot temperature is 37° C (Col. 6, Lines 3-12). Hence, upon reading the *Ilyes* reference, a person of ordinary skill would be discouraged from following the path set out in the *Ilyes* reference to produce a glass tube with a cold spot temperature of 60° C as suggested in the *Sarver* reference.

The *Sarver* reference teaches of desirable cold spot temperature ranges for a straight tube. There is no suggestion or motivation to change the desirable cold spot temperature of 37° C for a spiral shaped discharge tube in *Ilyes*, like the present invention, to a temperature range suggested in the *Sarver* reference, whose effect on a spiral discharge tube is unknown.

“Our reviewing courts have often advised the Patent and Trademark Office that it can satisfy the burden of establishing a *prima facie* case of obviousness only by showing some objective teaching in either the prior art, or knowledge generally available to one of ordinary skill in the art, that “would lead” that individual “to combine the relevant teachings of the references.” *In re Fine*, 837 F.2d 1071, 5 U.S.P.Q. 2d 899, 13 U.S.P.Q. 2d 1248 (Fed. Cir. 1989). Accordingly, an examiner cannot establish obviousness by locating references which describe various aspects of a patent applicant’s invention without also providing

evidence of the motivating force which would impel one skilled in the art to do what the patent applicant has done."

Ex parte, *Levengood*, 28 U.S.P.Q. 1300, 1302 (Fed. Cir. 1993).

Although, the *Sarver* reference teaches of a desirable cold spot temperature range, it fails to disclose, teach or suggest whether this range applies to steady state illumination or metastable, nonequilibrium state illumination. Claim 1 recites "a temperature of a coldest spot within the glass tube under steady state illumination." The *Sarver* reference teaches that the mercury zinc amalgam is in a metastable, nonequilibrium state (Col. 1, Lines 9-16). There is no suggestion or motivation to have the same cold spot temperature for steady state illumination as is appreciated for metastable, nonequilibrium state illumination.

Accordingly, Claim 1 of the present invention is not obvious over a combination of *Ilyes* in view of *Sarver*.

The Office Action contends that it "would have been obvious to one having ordinary skill in the art at the time the invention was made to provide the range for the wall loading of the lamp of Ilyes and Sarver being within 0.08 to .12 W/cm², for proper control of the cold sport temperature since optimization of workable ranges is considered within the skill of the art."

Applicant respectfully traverses this contention.

A particular parameter must first be recognized as a result-effective variable, i.e., a variable which achieves a recognized result, before the determination of the optimum or workable ranges of said variable might be characterized as routine experimentation. *In re Antonie*, 559 F.2d 618, 195 USPQ 6 (CCPA 1977) (The claimed wastewater treatment device had a tank volume to contractor area of 0.12 gal./sq. ft. The prior art did not recognize that treatment capacity is a function of the tank volume to contractor ratio, and therefore the parameter optimized was not recognized in the art to be a result-effective variable.).

MPEP §2144.05 (II)(B) (underline added)

The Office Action did not provide any reference that recognizes that the recited range of 0.08 W/cm² to 0.12 W/cm² inclusive is a result-effective variable. Accordingly, Claim 3 of the present invention is not obvious to one having ordinary skill in the art.

Claims 4-6, 8, 10-13 and 15-18 depend from Claim 1. Thus these claims are patentably distinct from the combined *Ilyes* and *Sarver* references for the same reasons advanced above with respect to Claim 1. Independent Claim 2, and its dependent Claims 9 and 14, are patentably distinct from the combined *Ilyes* and *Sarver* references for the same reasons advanced above with respect to Claim 1. Independent Claim 19 is also patentably distinct from the combined *Ilyes* and *Sarver* references for the same reasons advanced above with respect to Claim 1.

The newly drafted independent Claim 20 recites “a bulb wall loading is set so that a temperature of a coldest spot within the glass tube, under steady state illumination, is substantially equal to an optimum cold spot temperature of the glass tube at which maximum luminous flux is radiated.”

Neither *Ilyes* nor *Sarver* disclose, teach or suggest that the cold spot temperature, under steady state illumination, is substantially equal to an optimum cold spot temperature of the glass tube at which maximum luminous flux is radiated. Accordingly, Claim 20 of the present invention is not obvious over a combination of *Ilyes* in view of *Sarver*.

Claim 21 depends from Claim 20. Claim 21 recites “the glass tube contains about 3 mg of elemental mercury.” Neither *Ilyes* nor *Sarver* disclose, teach or suggest that glass tube contains about 3 mg of elemental mercury. Thus, Claim 21 of the present invention is not obvious over a combination of *Ilyes* in view of *Sarver*.

Applicant accordingly submits that the present invention is more than adequately distinguished over any combination of the references of record by the presently pending claims, and is worthy of patent protection.

If the Examiner believes a telephone interview will assist in the prosecution of this application, the undersigned attorney can be contacted at the listed phone number.

Very truly yours,

SNELL & WILMER L.L.P.



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